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3,608,405

TOGGLE LINK HAND TOOL HAVING RECTILINEAR JAW MOVEMENT

Filed Feb. 7, 1969

2 Sheets-Sheet 1

FIG. 1

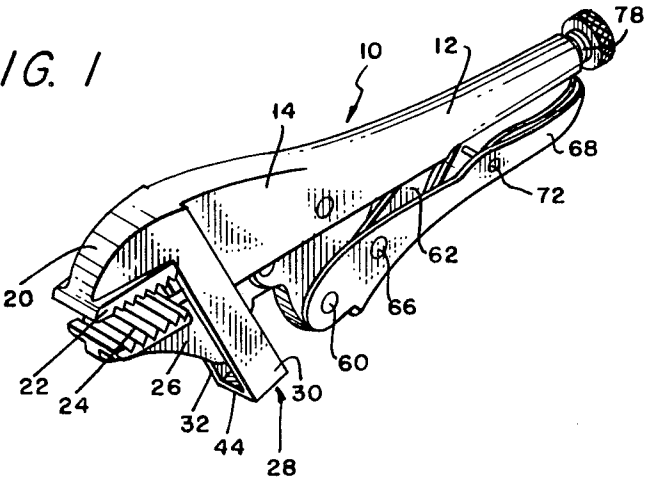


FIG. 2

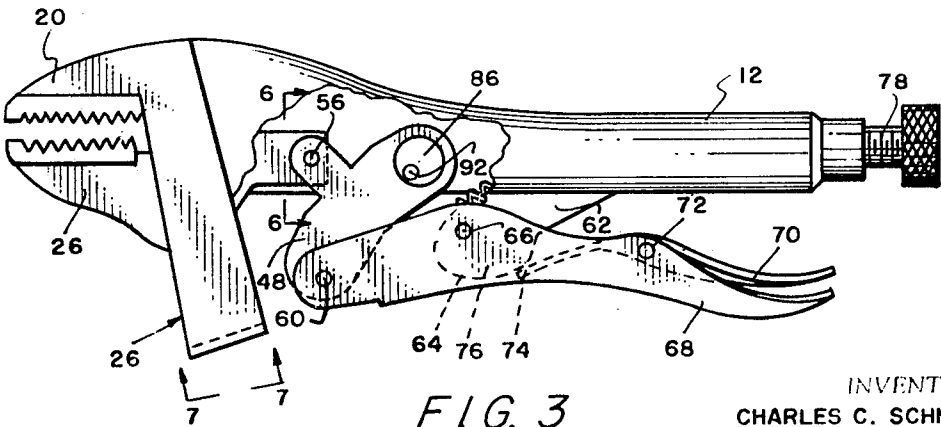
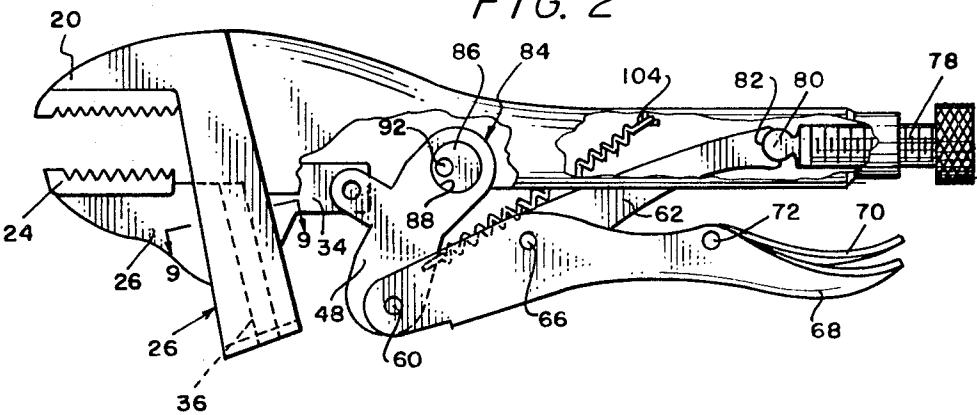


FIG. 3

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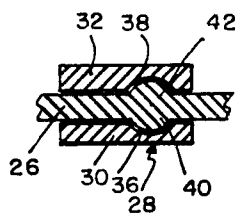
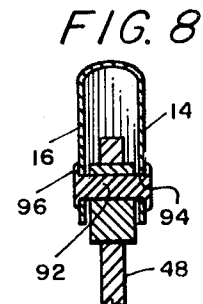
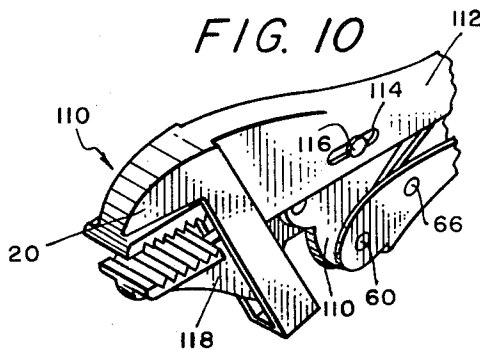
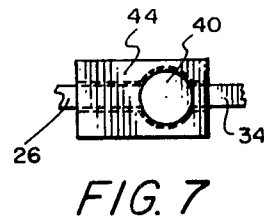
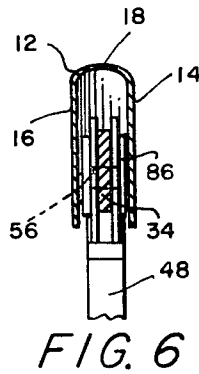
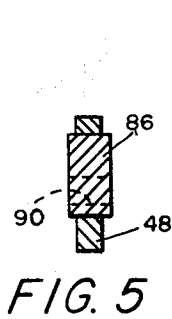
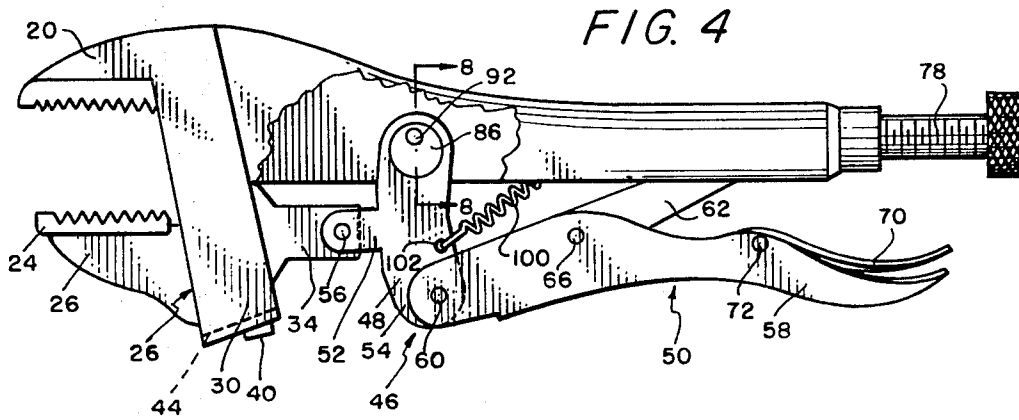
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2 Sheets-Sheet 2



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3,608,405
**TOGGLE LINK HAND TOOL HAVING
RECTILINEAR JAW MOVEMENT**
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Int. Cl. B25b 7/04, 7/12

U.S. Cl. 81—356

11 Claims

ABSTRACT OF THE DISCLOSURE

A toggle link type hand tool including conventional means for adjustably positioning the toggle linkage as well as conventional means for releasing the toggle linkage from locking against a load gripped by the tool. The tool is characterized by the movable jaw being guided for straight line, nonrotating translation relative to the fixed jaw together with a bell crank lever means drivingly connecting the toggle linkage to the movable jaw. Inasmuch as the toggle linkage and the movable jaw respectively travel straight line and curvilinear paths relative to the fixed handle and jaw, the bell crank lever means has a fulcrum that is automatically movable to accommodate such different motions.

The present invention pertains to new and useful improvements in toggle link type hand tools, and relates more particularly to such tools wherein the jaws are maintained in parallelism during opening and closing thereof.

The instant invention has to do with tools of the general type of tools disclosed in my U.S. Pat. No. 3,314,319 entitled Pliers-Type Hand Tool which issued Apr. 18, 1967, and in my U.S. Pat. No. 3,496,808 entitled Toggle Link Type Hand Tool which issued Feb. 24, 1970. The disclosures of such patent and patent application are incorporated herein by reference. An understanding of the principles of toggle link type tools can be augmented by persual of U.S. Pat. No. 3,210,070 which issued to Lagana, Jr., Oct. 5, 1965, U.S. Pat. No. 3,195,382 which issued to Rommel et al. July 20, 1965, and U.S. Pat. No. 2,112,192 which issued to Geddes, Mar. 22, 1938; the disclosures of these patents are also incorporated herein by reference.

While prior art proposals pertaining to toggle link type hand tools have made provision for maintaining the jaws in parallelism, each of the proposed structures has suffered from one or more shortcomings, at least for most tool usages, such as affording only a limited range of jaw movement, subjecting the workpiece to shear as well as compressive forces, being excessively bulky or ungainly, requiring the provision of additional means to effect opening movement of the jaws, etc.

The paramount object of this invention is to minimize or eliminate the shortcomings of prior proposals and to provide a toggle link type hand tool wherein the relative movement of the jaws is solely rectilinear and wherein the entrance between the jaws may be generally in alignment with and opposite the fixed handle.

Another object of the invention is to provide a tool of the character specified in the preceding paragraph wherein the movable jaw can be directly urged in both its closing and opening movements by appropriate manipulation of the toggle linkage.

Still another object of the invention is to provide a tool of the character specified above such that a single spring serves to open both the rectilinearly related jaws and the toggle linkage when the latter is released from a locked condition.

An important object of the invention is to produce a tool of the character specified above which is compact so as to enable usage with respect to a workpiece disposed

in a confined or relatively inaccessible space, and yet be such as to afford an optimized range of adjustment as to the spacing of the jaws.

It is also an important object of the invention to provide a tool of the character specified above which includes jaw members which are so related in space and relative movement that a very wide choice of specific form of the actual workpiece engaging elements or portions of the jaw members is available, as by way of example, the variety of specific forms and mountings of work engaging elements or portions of jaw members shown in my previously mentioned pending U.S. application Ser. No. 627,496.

Yet another object of this invention is to provide a tool of the general character specified above which will be durable and reliable in use, and which can be manufactured at a cost comparable to and preferably less than the cost of manufacturing conventional toggle link type hand tools of the type presently in very extensive use.

A broad aspect of the invention involves, in a toggle link hand tool of the type including a first jaw fixed to an elongated handle, a second jaw movable relative to the first jaw for coactively engaging a workpiece therebetween and toggle link means connected to the handle operable for urging the second jaw toward and away from the first jaw; the improvement comprising the provision of coacting guide means carried by the handle and the second jaw for guiding rectilinear movement of the second jaw toward and away from the first jaw, and coupling means pivotally connected to the toggle link means for drivingly coupling the toggle link means to the second jaw.

A somewhat more limited aspect of the invention as set forth in the preceding paragraph involves the coupling means comprising a bell crank element, first and second pivot means respectively pivotally connecting the bell crank element to the handle and to the second jaw, and at least one of said pivot means being provided with means for enabling shifting of the pivotal axis established thereby upon pivotal motion of the element relative to the toggle link means, whereby the driving connection between the curvilinear and straight line paths of the bell crank element and the second jaw can be maintained.

One aspect of the invention as set forth in the preceding paragraph involves, in effect, interpositioning of a link having parallel pivotal connections to the handle and to the bell crank element, with such effective interpositioning preferably taking the form of the bell crank element being journaled on a cylindrical body that is in turn eccentrically pivoted to the handle; or alternatively, the provision of a pivot pin slidable in a slot.

Another aspect of the invention involves the provision of a hand tool of the toggle link type comprising an elongated handle provided with a fixed jaw at one end thereof, said handle, adjacent its juncture with the fixed jaw, being provided with an integral bifurcated guide structure, an elongated movable jaw support extending through the bifurcated guide structure and being provided at one end thereof with a second jaw, said guide structure and the jaw support being provided with means for guiding the second jaw for straight and solely linear translation toward and away from the fixed jaw, said guide means comprising the guide structure and the jaw support having mating female and male surfaces in sliding engagement with each other, toggle link means comprising an elongated actuating handle, an elongated toggle link having one end pivotally connected to the actuating handle at a position intermediate the ends of the latter, means connecting the other end of the toggle link to the first mentioned handle, a bell crank element pivotally connected to one end of the actuating handle, pivot means for pivotally connecting the bell crank element to the first mentioned handle, pivot means for pivotally connecting

the bell crank element to the jaw support, and means provided in association with one of said pivot means for causing lateral shifting of the axis of the pivotal connection established thereby on guided movement of the second jaw to accommodate the linear movement of the second jaw to oscillatory movement of the bell crank element.

Other objects, aspects, features and advantages of the invention will become evident during the following description of the preferred embodiments of the invention, such description to be taken in conjunction with the accompanying drawings illustrative thereof, wherein:

FIG. 1 is an isometric view of the tool;

FIG. 2 is an enlarged side elevational view of the tool, with portions being taken away and hidden parts being shown in dashed outline for revealing internal details of construction;

FIG. 3 is another side elevational view of the tool generally similar to FIG. 2, but with the jaws being disposed in closer proximity to each other by virtue of the eccentric pivotal connection of the bell crank lever to the fixed handle;

FIG. 4 is yet another side elevational view of the tool generally similar to FIGS. 2 and 3, but with the jaws being shown with greater spacing by virtue of the eccentric pivot means and the extension of the stop adjustment;

FIG. 5 is an enlarged sectional detail view of the eccentric bearing and the bell crank lever journaled thereon taken upon the plane of the section line 5—5 in FIG. 3, with the pivot pin opening through the bearing being shown in dashed outline;

FIG. 6 is an enlarged sectional detail view taken upon the plane of the section line 6—6 in FIG. 3;

FIG. 7 is an enlarged fragmentary view of the guide structure, this view being taken from the plane of the section line 7—7 in FIG. 3;

FIG. 8 is a sectional detail view taken upon the plane of the section line 9—9 in FIG. 4;

FIG. 9 is an enlarged sectional detail view taken upon the plane of the section line 9—9 in FIG. 2; and

FIG. 10 is a fragmentary isometric view of a modified form of the invention.

Referring now to the drawings wherein like numerals designate like parts throughout the various views, and directing attention initially to the form of the invention shown in FIGS. 1—8, the reference numeral 10 designates generally the toggle link hand tool of the invention.

The tool 10 comprises an elongated handle 12 that is hollow and of an inverted-U configuration to include substantially parallel side walls 14 and 16 connected by an arcuate web or bight portion 18.

The handle 12 is provided at its forward end with a fixed integral jaw member 20, that carries a downwardly facing jaw element 22 for engaging a workpiece, not shown, in coaction with an upwardly facing, movable jaw element 24 carried by a jaw member or jaw support 26.

The integral structure constituted of the handle 12 and the fixed jaw member 20 is provided with an integral depending guide structure or guide means designated generally at 28. The guide means 28 depends from the handle 12 from a position adjacent the juncture of the handle 12 with the jaw member 20 and is of bifurcated form being comprised of a pair of spaced side walls 20 and 32 respectively attached to the side walls 14 and 16 of the handle.

The jaw support 26 is disposed below the jaw element and extends rearwardly between the guide structure walls 30 and 32 to terminate in an integral rear extension 34 disposed rearwardly of the guide structure 26.

The adjacent faces of the side walls 30 and 32 are respectively provided with elongated straight guide grooves 36 and 38. The opposite sides of the jaw support 26 are provided with outwardly projecting tongues or ribs 40 and 42 that are slidably and guidingly received in the grooves 36 and 38 as best shown in FIG. 9. The ribs 40

and 42 are straight and elongated, and they are approximately perpendicular to the horizontal plane defined by the longitudinal dimension of the handle 12. If desired or deemed expedient the inclination of the grooves 36 and 38 and the ribs 40 and 42 can be perpendicular to such horizontal plane; however, the illustrated inclination has been found to be quite satisfactory in an actual working model and in addition to present a particularly attractive appearance. It is much preferred that the longitudinal extent of the grooves 36 and 38 depart no more than about 30° from being perpendicular to the plane defined by the upper face of the jaw element 24, and it is preferred that such angular departure not exceed 20°. For some applications a lesser departure or no departure is desirable, such as when it is desired that a workpiece not be subjected to shearing forces between the jaw elements 22 and 24 being applied to grip the same. The grooves 36 and 38 and the ribs 40 and 42 constitute mating female and male surfaces in sliding and guiding engagement with each other. Many other equivalent mating guide surface arrangements will be obvious to those skilled in the art.

The lower ends of the side walls 30 and 32 are joined by an end wall 4 fixed thereto for preventing spreading of the latter. The end wall 44 can be attached to the walls 30 and 32 in any suitable manner such as by welding or the like, after the jaw support 26 has been guidingly inserted or assembled between the side walls 30 and 32. If desired, the end wall 44 can be provided with an opening 46 in alignment with the grooves 36 and 38 whereby the end wall 44 will not interfere with maximum opening or separation of the jaw elements 22 and 24 when the ribs 40 and 42 are extended downwardly, as is preferred, from the jaw support 26. In other words, the end wall 44 does not directly limit downward movement of the ribs 40 and 42 as will be evident on inspection of FIG. 4.

Means designated generally at 46 is provided for actuating guided movement of the jaw support 26 which comprises a bell crank lever or element 48 and the toggle link means designated generally at 50.

The bell crank lever or element 48 is partially received between the side walls 14 and 16 of the handle 12, is pivotally connected or fulcrumed against the latter by means to be presently described, and includes arms 52 and 54 that are pivotally connected to the rearward extension 34 of the jaw support 26 and the toggle link means 50, respectively.

The arm 52 is bifurcated and the extension 34, which is relatively reduced in its transverse extent, is received within the bifurcated arm 52 and pivoted thereto by a pivot pin 56 that passes entirely through the arm 52. The pin 56 has enlarged extremities, not shown, to prevent axial dislodgment. It is not essential that the arm 52 be bifurcated, and if deemed desirable or expedient, it will be evident to those skilled in the art that the arm 52 and the extension 34 can simply be arranged to overlap each other with the pivot pin 56 extending through the overlapped extents thereof.

The toggle link means 50 is comprised of an elongated lever or arm 58 that is hollow and of a transverse U-shaped configuration. The arm 54 of the bell crank lever 48 is received within the hollow forward end of the lever 58 and is pivoted thereto by a pivot pin 60 passing entirely through the lever 58 that has enlarged extremities, not shown, to prevent dislodgment.

The toggle link means 50 per se, as will be seen, is of essentially conventional character, and in essence differs solely from prior art means of the character illustrated or equivalents of such illustrated prior art means (as, for example, the adjustable toggle link means shown in FIG. 7 of previously mentioned U.S. Pat. No. 3,195,382) by virtue of its being connected to a bell crank lever with the latter operatively connecting structures moving along straight line and curvilinear paths. Accordingly, as employed in the appended claims, the expression "toggle link means" is to be deemed readable upon the

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toggle link means 50 of the accompanying drawings, the toggle link means shown in my U.S. Pat. No. 3,314,319 and in FIG. 7 of U.S. Pat. No. 3,195,382, and prior art equivalents thereof.

The illustrated toggle link means 50 includes an elongated toggle link or toggle support 62 having one end 64 received with the lever 58 and being pivoted thereto intermediate the ends of the latter by a pivot pin 66 that extends entirely through the lever 58. The opposite extremities of the pin 66 are enlarged, not shown, to prevent dislodgment thereof.

The portion of the lever 58 including the pivot pins 60 and 66 constitutes a toggle link that coacts with the toggle link 62 in the conventional manner, and the remaining portion of the lever 58 constitutes a movable handle 68 that can be manually grasped cooperatively with the fixed handle 12.

A conventional release lever 70 is provided within the handle 68 and is pivoted thereto at 72 so as to have one end 74 seated under a portion 76 of the toggle link 62.

An adjustment screw 78 is threaded into the rear end of the handle 12, and the inner end 80 of the same is of a ball-like configuration and is rotatably received in a socket 82 formed at an end of the toggle link 62 disposed within the handle 12.

The bell crank lever 48 is pivotally connected to or fulcrumed against the handle 12 by pivot means 84 having a shiftable pivot axis. The pivot means 84 comprises a cylindrical body 86 journaled through a circular opening 88 in the bell crank lever. The body 86 has a circular opening 90 therethrough, the axis of which is parallel to the spaced from the axis of the body 86.

A pivot pin 92 is journaled through the opening 90 and the opposite end portions of the pin 92 are journaled through aligned circular openings 94 in the side walls 14 and 16 of the handle 12. The opposite extremities of the pin 92 are enlarged as indicated at 96 to prevent dislodgment of the pin 92.

The pivot means 84 is therefore such that while the spacing of the pivot pin 56 from the axis of the body 86 remains constant, the pivotal axis of the body 86 is shiftable to move in a circular path or arc about the axis of the pivot pin 92 whereby a positive driving connection can be maintained between the pivot pins 60 and 56 despite the fact that the pivot pin 60 may be caused to move along a curvilinear path during manipulation of the toggle link means 50 while the pivot pin 56 is constrained to move along a straight line path.

The perpendicular spacing of the travel path of the pivot pin 56 from the axis of the body 86 is greater than the distance constituted of the perpendicular spacing thereof from the pivot pin 92 reduced by the spacing of the axes of the body 86 and the pin 92. Preferably the perpendicular spacing of the travel path of the pin 56 from the axis of the body 86 is greater than about the perpendicular spacing of such path from the pivot pin 92, and can be and preferably is very slightly less than or equal to the perpendicular spacing of the path of the pin 56 from the pin 92 plus the distance between the axes of the body 86 and the pin 92.

With the spacing of the pivot pin 56 from the center of the body 86 being A and the spacing of the center of the body 86 from the pivot pin 92 being B, the range of rectilinear movement of the jaw support 26 can be as great as four times the geometric mean of the lengths A and B when the perpendicular distance of the travel path of the pin 56 from the pin 92 plus the distance B equals the distance A. When such perpendicular distance is less than A minus B the range of movement of the jaw support 26 is reduced.

The operation of the tool 10 will be readily understood. Closing movement of the jaw element 24, that is movement toward the jaw element 22, is accompanied by clockwise movement of the bell crank lever 48 (as viewed in the drawings), and vice versa. Such movements of the

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jaw element 24 can be actuated by manipulation of the lever or arm 58 through the pivot pin 60. Preferably, opening movement of the jaw element 24 is assisted by the provision of a coiled tension spring 100 having one end attached at 102 to the bell crank lever 48 and having its other end disposed in the hollow handle 12 and attached to the latter at 104.

As will be evident to those familiar with toggle link type hand tools, the position of the handle 68 and the adjustment screw or stop means 78 can be adjusted so that the jaw elements 22 and 24 are adjustably spaced to engage a workpiece, not shown, disposed therebetween, with the pivot pin 66 being disposed below (as viewed in the drawings) a dead-center position between the pivot pin 60 and the ball-shaped end 80 of the screw 78. The handles 12 and 68 can then be manually gripped together whereupon the toggle link means 50 acts to urge the pivot pin 60 to the left and thereby subject the bell crank lever 48 to a great clockwise torque (as seen in the drawings) about its pivot means 84, which in turn applies a gripping or closing movement force to the jaw support 26 and the jaw element carried thereby. The gripping of the handles 12 and 68 can be carried to the extent that the pivot pin 66 passes upwardly slightly beyond its dead-center position (further motion is conventionally prevented by coaction of the toggle link 62 and the arm 58), whereupon the tool 10 becomes locked upon the workpiece, and will remain so until the handles 12 and 68 are forced apart as by the usual use of the conventional release lever 70.

It is manifest from the foregoing that the bell crank lever 48 serves as a positive coupling or driving connection between the toggle link means 50 and the rectilinearly moving jaw support 26 by virtue of the shifting or floating character of the pivotal axis defined by the pivot means 84.

The necessary shifting or floating pivot axis must be provided at either the pivotal connection of the lever 48 to the handle 12 or to the jaw support extension 34 in order to accomplish the forward and reverse drive to the jaw support 26 by the lever 48. The invention encompasses location of such pivot means at either of such locations and the claims are intended to be of such scope unless the location is specifically defined.

Attention is now directed to a modified form of the invention shown in FIG. 10 and designated generally at 110. The tool 110 is identical except as to the character of the pivotal connection between the bell crank lever and the fixed handle; such lever and handle being respectively designated at 112 and 114 and corresponding to the previously described lever 48 and handle 12. The modification simply consists, in lieu of the previously described pivot means 84, of the handle 112 being provided with a pair of elongated slots 114 on its opposite sides and a pivot pin 116 extending through such slots 114 and the bell crank lever 110. The pivot pin 116 is rotatable and slidable in the slots 114. In other words, the lever 110 can oscillate about the axis of the pin 116 while the latter can move toward and away from the travel path of the movable jaw support 118 (corresponding to the previously described jaw support 26). The pin 116 has enlarged extremities as shown to prevent dislodgment thereof and is preferably journaled through the lever 110.

The longitudinal extent of the slots 114 is approximately parallel to the extent of the handle 112, as this will cause the pin 116 to bear against the handle 112 along the lower edges of the slots. The length of the slots 114 is such that the pin 116 will be at or adjacent the forward ends of the slots 114 when the jaw support 118 is in its uppermost and lowermost adjustable positions, and to allow the jaw support 118 to move intermediate such positions.

The use of the tool 110 is identical to that of the tool 10. It is to be noted that oscillation of the lever 110 positively couples the toggle linkage to the jaw support 118

as to both the closing and opening movements of the latter.

It is to be noted that the tools 10 and 110 are each such as can be provided with adjustable stop means, such as disclosed in my U.S. Pat. No. 3,314,319, for limiting jaw closure, whereby the tools can be locked upon themselves, so to speak, thereby enabling the tools to be used as fixed wrenches or the like of adjustably selected size.

I claim:

1. In a toggle link hand tool of the type including a first jaw fixed to an elongated handle, a second jaw movable relative to the first jaw for coactively engaging a workpiece therebetween and toggle link means connected to the handle operable for urging the second jaw toward and away from the first jaw; the improvement comprising the provision of coating guide means carried by the handle and the second jaw for guiding rectilinear movement of the second jaw toward and away from the first jaw, and coupling means pivotally connected to the toggle link means for drivingly coupling the toggle link means to the second jaw, said coupling means comprising a coupling element having pivotal connections to the toggle link means and to the second jaw, with coupling means being carried by the handle by structure comprising a body pivotally connected to the handle and to the element about parallelly spaced axes, said body including a cylindrical portion journaled in the coupling element to define the pivotal connection of the body to the element, and the body being provided with a pivot pin eccentrically disposed relative to the cylindrical portion and which is connected to the handle.

2. The combination of claim 1, wherein the handle has an aperture therein of cylindrical configuration with the pivot pin being journaled in said aperture.

3. The combination of claim 1, wherein said pivot pin is journaled in the body for rotation of the body relative to the pivot pin about the axis of the latter.

4. In a toggle link hand tool of the type including a first jaw fixed to an elongated handle, a second jaw movable relative to the first jaw for coactively engaging a workpiece therebetween and toggle link means connected to the handle operable for urging the second jaw toward and away from the first jaw; the improvement comprising the provision of coating guide means carried by the handle and the second jaw for guiding rectilinear movement of the second jaw toward and away from the first jaw, and coupling means pivotally connected to the toggle link means for drivingly coupling the toggle link means to the second jaw, said coupling means comprising a coupling element having pivotal connections to the toggle link means and to the second jaw, with the coupling means being carried by the handle by structure comprising a body pivotally connected to the handle and to the element about parallelly spaced axes, said handle being hollow and including spaced side walls, said body being comprised of a cylindrical central portion disposed between the side walls with the axis of said cylindrical portion being normal to said side walls, said element having a portion thereof received between said side walls with such portion having a cylindrical opening therethrough, with said cylindrical portion of the body being journaled through said cylindrical opening, and wherein a pivot pin extends through the side walls and the cylindrical portion of the body, said pivot pin having an axis spaced from and parallel to the axis of the cylindrical portion of the body.

5. The combination of claim 4, wherein the pivot pin is journaled for rotation through the central portion of the body.

6. The combination of claim 5, wherein the side walls are provided with aligned circular apertures therethrough and wherein said pivot pin rotatably extends through said aligned apertures.

7. In a toggle link hand tool of the type including a

first jaw fixed to an elongated handle, a second jaw movable relative to the first jaw for coactively engaging a workpiece therebetween and toggle link means connected to the handle operable for urging the second jaw toward and away from the first jaw; the improvement comprising the provision of coating guide means carried by the handle and the second jaw for guiding rectilinear movement of the second jaw toward and away from the first jaw, coupling means pivotally connected to the toggle link means for drivingly coupling the toggle link means to the second jaw, said guide means comprising the second jaw and the handle being provided with an undercut groove and a mating tongue slidable in the groove, said coupling means comprising a bell crank element movably connected to the second jaw and movably connected to the handle, said toggle link means comprising an elongated actuating handle pivotally connected at one end thereof to said element, an elongated toggle support pivoted at one end to the actuating handle at a position intermediate the ends of the latter, stop means movable along the first recited handle together with means for restraining the stop means against movement along such handle from the first jaw, and said toggle support having its other end in engagement with the stop means.

8. A hand tool of the toggle link type comprising an elongated handle provided with a fixed jaw at one end thereof, said handle, adjacent its juncture with the fixed jaw, being provided with an integral bifurcated guide structure, an elongated movable jaw support extending through the bifurcated guide structure and being provided at one end thereof with a second jaw, said guide structure and the jaw support being provided with means for guiding the second jaw for straight and solely linear translation toward and away from the fixed jaw, said guide means comprising the guide structure and the jaw support having mating female and male surfaces in sliding engagement with each other, toggle link means comprising an elongated actuating handle, an elongated toggle link having one end pivotally connected to the actuating handle at a position intermediate the ends of the latter, means connecting the other end of the toggle link to the first mentioned handle, a bell crank element pivotally connected to one end of the actuating handle, pivot means for pivotally connecting the bell crank element to the first mentioned handle, pivot means for pivotally connecting the bell crank element to the jaw support, and means provided in association with one of said pivot means for causing lateral shifting of the axis of the pivotal connection established thereby on guided movement of the second jaw to accommodate the linear movement of the second jaw to oscillatory movement of the bell crank element.

9. A toggle link hand tool comprising an elongated handle having a fixed jaw at one end thereof, a movable jaw for coaction with the fixed jaw, means for guiding rectilinear movement of the movable jaw toward and away from the fixed jaw, workpiece engaging elements carried by the jaws, a bell crank lever pivoted to the movable jaw, pivotal connecting means having spaced pivotal connections to the handle and to the bell crank lever, and toggle link means, including a movable handle pivoted to the bell crank lever for urging swinging movement of the latter about the pivotal connecting means, whereby swinging movement of the bell crank lever in one direction forces rectilinear motion of the movable jaw toward the fixed jaw.

10. The combination of claim 8, wherein the last recited means comprises said first mentioned handle having an elongated slot therein that is generally parallel to the longitudinal extent of the first mentioned handle, and said pivot means for pivotally connecting the bell crank element to the first mentioned handle comprising a pivot pin disposed in and laterally slidable in said slot along the longitudinal extent of the slot.

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11. The combination of claim 10, wherein the first mentioned handle is hollow and includes spaced side walls, and wherein the elongated slot in the first mentioned handle is defined by each of the side walls having an elongated slot therein, said bell crank element having a portion thereof disposed between the side walls, said pivot pin extending through said portion of the bell crank element and having opposite end portions slidably disposed in the slots in the side walls.

10**References Cited****UNITED STATES PATENTS**

2,417,013	3/1947	Petersen	-----	81—356
2,481,866	9/1949	Petersen	-----	81—356

OTHELL M. SIMPSON, Primary Examiner

U.S. Cl. X.R.

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